Immigration and the Demand for Urban Housing

by

Miles M. Finney
California State University - Los Angeles

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Abstract

The immigrant population has grown dramatically in the US in the last fifty years. This study estimates housing demand among immigrants and discusses how immigration may be altering the structure of US urban areas. Immigrants are found to consume less housing per capita than native born US residents.

* Correspondence to: Miles Finney, Department of Economics and Statistics, California State University, Los Angeles, CA 90032; phone: (323) 343-2937, email: mfinney5@calstatela.edu

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I. Introduction

The physical characteristics of cities reflect to a large degree their housing stock. Descriptions of an urban area – dense, sprawling, dilapidated – reference largely the state of its housing. Residential housing in the US, making up approximately 36% of the country's fixed capital, is supplied through markets – public authorities maintain a miniscule portion of the total stock.[1] The housing stock has changed over time. For example, the median size of a single-family home built in 2010 was over one-third larger than in the early 1970's.[2] The changes in housing structure over time are assumed to reflect market demand.

This study examines the effect immigration potentially is having on urban form through the demand for housing. Despite its durability, approximately half the existing housing stock in the US has been built in the last forty years.[3] Immigrants may represent an exogenous change in housing demand. The large recent changes in the size and origins of the foreign-born may be altering patterns of development in US urban areas, particularly in terms of density. This study uses American Housing Survey data to examine immigrant demands for urban housing quantity relative to the native-born population.[4]

The foreign-born in the US has undergone changes in trend over time. The approximately thirty million immigrants arriving during the mass migration over 1850-1910

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[1] BEA Fixed Assets Accounts Tables Fixed asssets include equipment and intellectual property https://apps.bea.gov/iTable/iTable.cfm?ReqID=10&step=1#reqid=10&step=1&isuri=1

The 2010 Census records a total housing stock of approximately 131 million units. Data from Housing and Urban Development indicates in 2014 there were 1.2 million public housing units.

[2] This statistic is taken from the Census document: https://www.census.gov/const/C25Ann/sftotalmedavgsqft.pdf

[3] This statistic is taken from the American Community Survey.

[4] Any views expressed are those of the authors and not those of the U.S. Census Bureau. The Census Bureau's Disclosure Review Board and Disclosure Avoidance Officers have reviewed this information product for unauthorized disclosure of confidential information and have approved the disclosure avoidance practices applied to this release. This research was performed at a Federal Statistical Research Data Center under FSRDC Project Number 2481. (CBDRB-FY21-P2481-R9099).

outnumbered the total US population at the beginning of the period. The immigrants, most of whom European, pushed, by 1910, the foreign-born to 14.7% of the US population, a proportion that has not since been exceeded (Abramitzkey et. agl., 2014). Immigration restrictions passed by Congress in 1917 and 1924 contributed to a relative decline in the foreign-born over the next 50 years.

Legislation in 1965 reversing restrictions on immigration from Asian countries and encouraging family consolidation induced a shift in migration that shapes the foreign-born population today (Massey and Pren, 2012). The foreign born has grown from 9.6 million in 1970 to nearly 45 million and now represents 13.6% of the population, the highest percentage since 1910.[5] The composition of immigrants has changed. The share of the foreign-born from Asian countries has risen from 8.9% in 1970 to 31% in 2019. Those from Latin America have grown from representing 19.4% of the foreign born in 1970 to 50.6% in 2019 (Greico et al., 2012).

Studies of post-1970 immigrant cohorts have estimated gaps in homeownership relative to the native-born that have not diminished over time (Borjas, 2002 and Painter and Yu, 2018). Saiz (2003, 2007) have found immigration may substantially increase housing costs in urban areas, at least in the short run. Gruelich et al. (2004) and Ottaviano and Peri (2006) suggest the housing cost burden immigration generates for native-born populations may be mitigated by positive income effects of immigration. Residential segregation between the foreign born and native populations, reflecting the housing choices of both groups, has been found to have increased over time (Culter et al., 2008, Saiz, 2011).

This study examines whether the recent discontinuous change in the immigrant population could alter the structure of urban areas. This study finds that foreign born households demand less urban housing than the larger US population, potentially contributing to urban

[5] US Census: https://www.census.gov/newsroom/pdf/cspan_fb_slides.pdf

density. These effects vary by region of origin. Latin Americans, predominant among recent immigrants, demand less housing on average than other immigrant groups, and their effects are estimated to have grown over time. Changes in mean equilibrium demand for housing quantity could potentially serve as market signals inducing changes in the structure of newly built housing.

II. American Housing Survey Sample

This study uses data from the American Housing Survey (AHS) over the period 2001-2017. The AHS consists of a biennial longitudinal survey for a national cohort of households and supplemental individual surveys of households selected from a rotating set of metropolitan areas. This study includes data from the nine national surveys taken over 2001-17 and the six metropolitan area surveys conducted since 2007, the initial year the two surveys were undertaken simultaneously. Over 2001-13 the AHS followed a national cohort initially drawn in 1985. A new national sample was drawn as of 2015. The data set constructed for this study includes restricted variables in the AHS's internal use file.

This study examines the determinants of housing demand by narrowing the sample to households that had relocated within 2 years of being surveyed by the AHS. This allows some households from the national cohort to be observed more than once. Households residing in group homes or in such structures as boats or mobile homes are excluded. The sample is also restricted to households residing in urban areas, which are consistently defined by the 2003 Core Based Statistical Areas. The AHS provides location information on households down to the level of the census tract.

III. First Stage Specification

A residence is treated as a bundle of characteristics, represented by the vector **z** in equation 1. This study estimates the demand for housing by first determining the implicit prices of property characteristics and the surrounding environment (Rosen, 1974). The market rent of a residence, P, is a function of the set of amenities (and disamenities) a particular house embodies.

(1) $P = f(\mathbf{z})$

The vector **z** includes property and community characteristics. This study defines community by both the household's immediate neighborhood and the larger urban area. Equation 1 is estimated with a log-log specification to account for the likely nonlinear relationship between a property's non-dichotomous characteristics and their prices.

The derivative of the function f(**z**) with respect to characteristic $\mathbf{z_i}$ generates individual attribute price, P_{zi}.

(2) $$P_{z_i} = \frac{\partial f(\mathbf{z})}{\partial z_i}$$

The individual price functions for the continuous property characteristics are composed of tangencies of household bids and landlord offers. In the Rosen model landlord offers are determined by the marginal cost of providing the attribute (Day, 2001).[6] A characteristic's marginal unit has a market clearing price that may vary across housing markets. The function allows characteristic marginal prices to vary across households.

In equation 1, *P* represents the dollar value of the flow of housing services consumed per period. Monthly rent represents *P* for rented properties. Households residing in properties they own are consuming a flow of housing services whose implicit rent is a function of the value of the housing stock. This study calculates the implicit rent for owned properties using the equation, $P = (i + t + d - g)V - (i + a + t)TV$, where *i* is the real interest rate, *t* the property tax rate, *d* represents depreciation and maintenance expenditures, *a* is the inflation rate, *g* represents capital gains, *T* is the household's marginal income tax rate, and *V* is the property value (Quigley and Raphael, 2004).

[6] The implicit prices retrieved from the log-log function are in levels. The hedonic price for characteristic $\mathbf{z_i}$: $P_{z_i} = \alpha_i f(z) \cdot \frac{1}{z}$ where α_i is the coefficient estimate for characteristic **z**, and the predicted value f(z) is not logged.

The property tax rate is taken from the AHS which records the yearly tax liability for a subset of non-renting households. The tax measure is calculated as state-level averages of the individual household rates. Thirty-year average mortgage rates from Freddie Mac serve as the yearly real interest rate. The yearly annual inflation rate is taken from the Bureau of Economic Analysis. The estimated annual housing depreciation rate of 0.019 is taken from Harding, Rosenthal and Sirmans (2007). The *Harding* study also estimates capital gains from housing to be zero. Marginal income tax rates by year correspond to the federal income tax code.

Equation 1 estimates hedonic prices for square footage, number of bedrooms and bathrooms, and house age. The specification also controls for four dichotomous characteristics: whether the property is detached, has central air, and whether the unit is part of a small or large complex.[7] The community characteristics that partially determine willingness to pay are modeled at the level of the immediate neighborhood and urban area. The household's immediate neighborhood is constructed by adding surrounding census tracts until their population sum reaches 30,000. The demographic characteristics controlled for at both levels are median (mean) income, percent college graduate, percent less than high school, and the proportions Black, Latino and Asian. Total population is also controlled for at the urban area level. This study uses 2000 Census data to construct demographic characteristics for households in the 2001-2009 AHS, the 2010 Census for the subsequent years.[8]

[7] A small complex is defined as 20 units or fewer which is at the 75th percentile of multiunit complexes, a large complex is defined as having more than 80 units which is at the 90th percentile.

[8] The 2001 and 2003 AHS used 1990 used 1990 census tracts. The assigning of 2000 tract level was done through the use of Census overlay files. The 2011 AHS used 2000 census tracts and was transferred to 2010 by overlay files provided by the Census.

IV. Second Stage Specification

The second stage specification estimates the quantity demanded of housing by households as a function of housing characteristic prices and household demographic characteristics, including immigrant status. Equation (3) represents housing demand where the dependent

$$\mathbf{z}_j = f(P_{\mathbf{z}_j}, P_{\bar{z}}, E, Y, K, T) \tag{3}$$

variable, $\mathbf{z_j}$, is square footage for property *j*, $\boldsymbol{P}_{\mathbf{z}_j}$ is the implicit price of housing quantity, $\boldsymbol{P}_{\bar{\boldsymbol{z}}}$ is a vector of hedonic prices of the remaining continuous housing characteristics, **E** represents a set of household demographic characteristics, ***Y*** is the household's non-housing income, and ***K*** and ***T*** are state and year dummy variables.

The demographic covariates in ***E*** are the household's age, size, race, education attainment, and marital, immigrant and Hispanic status. The AHS collects data for each household from a single respondent, identified as the householder. This study defines the demographic characteristics of the household primarily by the householder. Hispanic households are defined as those in which the householder is Hispanic and has a racial identification of White. The covariates Black and Asian are included as racial designations. The assigned marital status and age of the household are that of the householder. Household size is calculated including all family and non-family members. The household's education attainment equals the highest level reached by the householder or partner.

This study identifies households as immigrant if the householder were born outside the country to non-US parents. The AHS data indicates country of birth, and year moved to the US.[9] The variable indicating year of migration is used in specifications estimating housing demand by

[9] The 2001, 2003 and 2005 AHS exhibited high mismatch rates in which the place of birth for over 15% of the sampled immigrants could not be assigned to any country. These surveys were excluded from the models that included the place of birth variable.

immigrant cohort. This study employs the World Bank designations to assign immigrant households to region of origin.[10]

Equation 3 estimates the demand for housing using ordinary least squares. Housing square footage is regressed on its own implicit price, $\boldsymbol{P_{z_j}}$, taken from equation 2, as well as the hedonic prices of bedrooms, bathrooms, and house age in $\boldsymbol{P_{\bar{z}}}$. Income enters the second stage specification as net of housing costs. Non-housing income, $\boldsymbol{Y}$ is calculated for renters by subtracting monthly housing costs from the household's reported income. For owners, housing costs are considered equal to the income generated by homeownership. Non-housing income for homeowners equals the household's reported income. The time dummy variable $\boldsymbol{T}$ corresponds to the year the household is observed to have relocated.

V. Empirical Results

The specifications in Tables 1 through 3 estimate the demand for housing by households over the period 2001-15. The results correspond to the second stage of the hedonic model and include as covariates the implicit prices of the non-discrete housing characteristics estimated in the first stage (shown in Appendix A). Immigrants are distinguished by region of origin in Table 2 and by cohort in Table 3. The dependent variable in all models is the untransformed square footage of the unit acquired by the household.

The fixed effect for Foreign Born in Table 1 indicates immigrant households consume ninety-five fewer square feet of housing tha]n otherwise equivalent non-immigrant households. The statistically significant point estimate, representing approximately seven percent of the average unit's size in the sample, is large relative to the other dichotomous effects estimated for

[10] The seven regional classifications are Central Asia, Latin America, Middle East, North America, East Asia, Africa, and South Asia. The World Bank designations are found in https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups. The only deviation this paper makes from the World Bank's regional designations is for Australia and New Zealand. Those countries are included as part of Europe/Central Asia instead of East Asia.

the full sample. For example, immigrant status has a larger effect than any pairwise fixed effect for education level. The effect is larger than all the pairwise ethnicity effects except for the estimated difference in housing demand between Black and Asian households. Immigrant status has an estimated effect comparable to the impact of marital status.

Black households are found, holding other factors constant, to acquire more housing square footage than the other ethnic groups. This relationship is statistically significant across pairwise comparisons for the full and non-immigrant samples. The positive household age relationship corresponds with age profiles estimated by studies such as Eichholtz and Lindenthal (2014), and Green and Lee (2016). An additional household member increases the predicted unit size by 117.2 square feet for non-immigrant households, 92.87 for immigrant – both effects statistically significant. Marriage increases the demand for square footage only for non-immigrant households. All three specifications indicate households that purchase their property acquire substantially more housing than otherwise equivalent households that rent. This effect is larger among immigrants than non-immigrants. The differences in housing demand across education levels are small across specifications in Table 1 and the point estimates are, with one exception, statistically insignificant. The results suggest education does not substantially influence housing quantity demanded beyond its effect on household income. This contrasts with Green and Lee (2014) which finds significant effects suggesting housing demand increases monotonically with education level.

The effect immigrant status has on housing demand is decomposed by region and year cohorts in the specifications shown in Tables 2 and 3. The regression model used to estimate the region-specific fixed effects in Table 2 include all the covariates in table 1. The reference group in Table 2 is non-immigrant households. The point estimates by region reflect variation around the predicted 95 sq. ft. difference in housing consumption between immigrant and non-immigrant households shown in Table 1.

Table 2 indicates the demand for housing among immigrants varies widely by region of origin. South Asian immigrants are found to demand 247 fewer square feet of housing than non-immigrant households; the estimated deviation for immigrants from North America is less than one square foot. Housing consumption by European, North American and African immigrants does not significantly differ from non-immigrants. North American immigrants are primarily Canadian. The rationale for the variation in immigrant housing demands by geographic origin can only be conjectured, but the statistically insignificant difference in consumption between European/Canadian immigrants and the larger US population suggests a transmission of preferences over geography. Most US residents trace their roots to Europe.[11] The 1,157 households from Europe made up the third largest immigrant group in the data. The results suggest housing consumption by more recent European immigrants have not deviated from the demands of those who migrated from Europe in prior generations.

In Table 2, statistically significant estimates indicate immigrants from Latin America, South and East Asia, and the Middle East demand less housing than the larger US population. The effects are not small. The (unweighted) average of the point estimates suggests households from the regions consumed 156 fewer square feet of housing (11% of the average unit size) than non-immigrant households. Households originating in Latin America and Asia make up 77% of the foreign born in the sample.

The housing demand estimates by cohort in Table 3 are taken from the regression specification in table 1. The cohorts represent the decade the householder migrated to the US. The left-out reference group for each of the specifications is non-immigrant households.[12] The cohorts are meant to account to consumption patterns related to period of entry. The parameter

[11] https://www.census.gov/library/publications/2004/dec/c2kbr-35.html.

[12] Foreign-born households arriving before 1960 also remain in the data for each of the specifications.

estimates, however, may also be picking up the effects of life-cycle changes and acculturalization over time. The regression models control for age and size of the household, which are more direct life-cycle measures.[13]

During the 1960's, the pool of the foreign born began to shift from Europe, a region whose housing demand appears in Table 2 to align with the larger US population. The effects of the altered migration patterns do not appear to reveal themselves for the full sample until the 1990 cohort. The results in Table 3 suggest post-1990 arrivals demanded substantially less housing compared to those arriving immediately prior.

The statistically significant results in Table 2 indicate immigrants from Asia, Latin America and the Middle East demand less housing than non-immigrants. Immigrants from Latin America and Asia have grown to make up over 80% of the US foreign born. Consistent with the results for the full sample in Table 3, the deviation in housing demand among the two groups appears to be recent. Latin Americans entering in 1990-2000 demanded 106.8 fewer square feet of housing than otherwise equivalent non-immigrant households. This deviation grows to 169 square feet for the following cohort. Both effects are statistically significant.

The negative deviation in housing demand among Asian immigrants appears to be led by those from South Asia – a group with a smaller presence in the US than those from East Asia. South Asians migrating to the US over 2000-2010 acquired homes with 298 fewer square feet than the larger US population, a figure almost twice as large as that for immigrants from Latin America. The effect grew for the subsequent cohort. In contrast, the point estimates for East Asian immigrants are consistently smaller than the Latin American effects across cohorts and are statistically insignificant with the exception of the 2010-17 cohort. The results suggest the

[13] The parameter estimates in Table 3 do not substantially change if Age is entered quadratically.

immigrant effects on housing demand are being driven by recent migrants, and primarily, due to their size, by those from Latin America.

VI. Conclusion

The US foreign-born population has grown dramatically in the last fifty years. This study examines the possible impact this growth may be having on urban housing demand. Immigrants reside disproportionately in urban areas. Their demands for housing may influence the development of urban areas. This study finds that immigrants generally demand less housing than non-immigrant US residents. It is possible that cities may be undergoing change in terms of their housing infrastructure, density and degree of sprawl due to the demands of immigrants.

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Table 1
Demand for Urban Housing Square Footage

Variable	Full Sample	Non-Immigrant	Immigrant
Intercept	355.7	308.87	-258.2
	(103.5)	(144.8)	(296.1)
Hedonic Price of Square Footage	-578.9*	-642.08*	-436.5*
	(69.59)	(68.39)	(79.55)
Home Owner	447.8*	419.9*	529.1*
	(26.53)	(26.83)	(48.65)
Non-housing Income	0.578*	0.493*	0.962*
	(0.158)	(0.166)	(0.193)
Demographics			
Black	82.79*	93.41*	-53.13
	(34.29)	(35.90)	(41.52)
Latino	-11.75	-19.44	-7.940
	(19.22)	(18.75)	(52.17)
Asian	-87.57*	-53.29	-119.2*
	(28.79)	(48.79)	(55.76)
Age	4.229*	4.012*	6.005*
	(0.5145)	(0.426)	(1.378)
Married	94.26*	111.1*	0.973
	(10.48)	(13.72)	(22.51)
High School Graduate	-29.27	-56.23*	47.56
	(19.33)	(25.68)	(26.26)
Some College	-24.71	-45.68	17.10
	(27.30)	(34.26)	(52.82)
Bachelor's	-22.46	41.10	-5.328
	(35.59)	(37.50)	(56.84)
Post-Baccalaureate	24.49	16.84	5.010
	(47.66)	(43.86)	(102.5)
Household Size	112.8*	117.2*	92.87*
	(7.272)	(8.637)	(10.39)
Foreign Born	-95.01*	----------	---------
	(24.61)		
Fixed State and Year Effects	Yes	Yes	Yes
Hedonic Price Effects	Yes	Yes	Yes
Observations	72000	59000	12500
R^2	0.2220	0.2344	0.1942

* Significant at 5% level. Standard errors, in parentheses, are clustered by urban area.

Table 2
Immigrant Effects on Demand
for Housing by Region of Origin

Region of Origin	Estimated Effect	Observations within Sample
Europe/Central Asia	-55.21	1200
	(80.75)	
Latin America	-122.7*	4700
	(16.81)	
Middle East	-180.4*	550
	(49.70)	
North America	-0.939	200
	(104.2)	
East Asia	-75.75*	2500
	(34.07)	
Africa	-14.72	500
	(115.7)	
South Asia	-247.1*	750
	(31.73)	
Observations	57000	

Results correspond to the regression model with covariates shown in table 1. * Significant at 5% level. Standard errors, in parentheses, are clustered by urban area. The regression model generating the above statistics did not include the 2001, 2003 or 2005 AHS, due to a decrease in reliability in matching immigrants in the data to country of origin.

Table 3
Immigrant Effects on Demand for Housing
by Decade of Entry to the US

Immigrant Cohort	Full Sample	Latin America	East Asia	South Asia
Entry 1960-70	-148.8*	-106.6	-147.0	-292.4
	(67.70)	(66.17)	(126.4)	(191.2)
Entry 1970-80	-64.29	-94.20**	-14.14	456.7
	(71.17)	(49.78)	(168.3)	(289.5)
Entry 1980-90	-38.51	-60.78	-23.72	-31.42
	(47.88)	(49.78)	(54.34)	(131.9)
Entry 1990-00	-113.2*	-106.8*	-78.17	-126.0
	(40.41)	(41.47)	(51.23)	(85.32)
Entry 2000-10	-140.4*	-169.2*	-67.70	-299.0*
	(25.62)	(21.84)	(52.09)	(36.47)
Entry 2010-17	-96.86*	-33.18	-87.41*	-306.2*
	(24.86)	(31.96)	(39.65)	(67.77)
Observations in Regression	72000	51500	49000	47500
Sample from Region	-------	4700	2500	750
Sample	Full Sample	Full sample minus Non-Latin American immigrants and those for whom region of origin could not be determined	Full sample minus Non-East Asian immigrants and those for whom region of origin could not be determined	Full sample minus Non-South Asian immigrants and those for whom region of origin could not be determined

Results correspond to the regression model in table 1. The specifics for the Latin American, East and South Asian, and Middle Eastern immigrants exclude the 2001, 2003 and 2005 AHS. The left-out group for the region-specific models consists of non-immigrants. *Significant at 5% level; ** 10% level. Standard errors, in parentheses, are clustered by urban area.

Table 4
Summary Statistics for Housing Demand Model

	Mean	Standard Deviation
Square Footage	1417	1765
Hedonic Price per Sq.ft.	1.594	1.043
Non-housing Income ($1000's)	50.03	111.9
Married	0.387	0.487
Non-Hispanic White	0.524	0.499
Black	0.167	0.373
Asian	0.072	0.259
Hispanic	0.136	0.342
Age of Householder	39.24	15.08
Post-Baccalaureate	0.148	0.355
Bachelors	0.242	0.428
Some College	0.315	0.464
High School Graduate	0.201	0.401
Household Size	2.426	1.410
Homeowner	0.299	0.458
Foreign Born	0.176	0.381

The sample size is 72000.

Appendix A
First Stage Hedonic Model

Variable	Full Sample
Intercept	0.691
	(0.967)
Housing Characteristics	
Square Footage	0.177*
	(0.014)
Bathrooms	0.487*
	(0.023)
Bedrooms	0.031
	(0.031)
House Age	-0.047*
	(0.005)
Detached House	0.277*
	(0.021)
Small Complex	0.150*
	(0.016)
Large Complex	0.231*
	(0.029)
Central Air Conditioning	0.041*
	(0.018)
Urban Characteristics	
Median Income	0.658*
	(0.096)
Population	0.051*
	(0.020)
Percent less than High School	0.190*
	(0.087)
Percent College Graduate	-0.008
	(0.099)
Percent Asian	0.097*
	(0.037)
Percent Latino	-0.008
	(0.035)
Percent Black	-0.048*
	(0.022)
Neighborhood Characteristics	
Mean Income	-0.0118
	(0.0357)
Percent less than High School	0.005
	(0.024)
Percent College Graduate	0.297*
	(0.025)
Percent Asian	0.058*
	(0.009)
Percent Latino	0.022*
	(0.009)
Percent Black	-0.023*
	(0.008)
Observations	71000
R^2	0.2613